



DEFENSE INFORMATION SYSTEMS AGENCY

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IN REPLY
REFER TO: Joint Interoperability Test Command (JTE)

16 Jul 10

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Juniper MX Series with Juniper Operating System (JUNOS) 9.3 R.4.4.

References: (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008
(c) through (e), see Enclosure 1

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.

2. The Juniper MX480 and MX240 with JUNOS Release 9.3 R4.4 are hereinafter referred to as the system under test (SUT). The Juniper MX480 met the interface and functional requirements for an Assured Services Local Area Network (ASLAN) core, distribution, and access switch as described in Reference (c). The Juniper MX240 met the interface and functional requirements for an ASLAN distribution and access switch as described in Reference (c). The SUT is certified as interoperable for joint use within the Defense Switched Network (DSN) with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 10000/1000Base SX/LX and 10/100/1000BaseT. Testing was conducted using test procedures derived from Reference (d). The Juniper MX960 employs the same software and similar hardware as the Juniper MX480. The JITC analysis determined this system to be functionally identical to the SUT for interoperability certification purposes and it is also certified for joint use.

The SUT is certified to support DSN Assured Services over Internet Protocol. If a component meets the minimum requirements for deployment in an ASLAN, it also meets the lesser requirements for deployment in a non-ASLAN. Non-ASLANs are "commercial grade" and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. The SUT is certified for joint use deployment in a non-ASLAN for C2R and non-C2 traffic. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but is limited to supporting calls that are originated at ROUTINE precedence only. Non-ASLANs do not meet the availability or redundancy requirements for C2 or Special C2 users and therefore are not authorized to support precedence calls originated above ROUTINE.

Testing of the SUT did not include video services or data applications; however, simulated preferred data, best effort data, and video traffic were generated during testing to determine the SUT's ability to prioritize and properly queue voice media and signaling traffic. No other configurations, features, or functions, except those cited within this document, are certified by the JITC. This certification expires upon changes that affect interoperability, but no later than three years from the date of Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation.

3. This finding is based on interoperability testing conducted by JITC, DISA adjudication of open test discrepancy reports (TDRs), review of the vendor's Letters of Compliance (LoC), and DSAWG accreditation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 4 January through 12 March 2010. Regression testing to include Multiprotocol Label Switching was conducted from 3 through 21 May 2010. Review of the vendor's LoC was completed on 7 May 2010. DISA adjudication of outstanding TDRs was completed on 7 July 2010. DSAWG granted accreditation on 29 June 2010 based on the security testing completed by DISA-led IA test teams and published in separate reports, Reference (e).

4. Table 1 provides the SUT's interface status. The SUT capability and functional requirements are listed in Table 2.

Table 1. SUT Interface Status

Interface	Applicability			CRs/FRs (See note 1.)	Status		
	Co	D	A		Co	D	A
Network Management Interfaces for Core Layer Switches							
EIA/TIA-232 (Serial)	R	R	R	EIA/TIA-232	Met	Met	Met
IEEE 802.3i (10BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Not Tested ²		
IEEE 802.3u (100BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Met ^{3,4,5}	Met ^{3,4,5}	Met ^{3,4,5}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Met ^{3,4,5}	Met ^{3,4,5}	Met ^{3,4,5}
Uplink Interfaces for Core Layer Switches							
IEEE 802.3u (100BaseT UTP)	R	R	R	1-15, 16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseFX)	C	C	C	1-6, 11, 16, 18-24, 28-31, 40-41, 44-53, 55-60, 65-75	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1-16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3z (1000BaseX Fiber)	R	R	C	1-5, 8-16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3ae (10GBaseX)	C	C	C	1-5, 8-16, 18, 19, 40-41, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
Access Interfaces for Core Layer Switches							
IEEE 802.3i (10BaseT UTP)	C	C	R	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseT UTP)	R	R	R	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseFX)	C	C	C	1-6, 11, 18-24, 28-31, 44-54, 58-71	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3z (1000BaseX Fiber)	R	R	C	1-6, 11, 18-24, 28-31, 44-54, 58-71	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
Generic Requirements for all Interfaces							
Generic Requirements not associated with specific interfaces	R	R	R	30-32, 35, 36, 40, 69-71	Met	Met	Met
DoD IPv6 Profile Requirements	R	R	R	UCR Section 5.3.5.5	Met	Met	Met
Security	R	R	R	UCR Sections 5.3.1.3.8, 5.3.1.5, 5.3.1.6, and 5.4	Met ⁹	Met ⁹	Met ⁹

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Table 1. SUT Interface Status (continued)

NOTES:

1 The SUT's specific capability and functional requirement ID numbers depicted in the CRs/FRs column can be cross-referenced in Table 2. These requirements are for the following Juniper MX switch models: **MX480** and MX960, which are certified in the ASLAN core, distribution, and access layers, and the **MX240**, which is certified in the ASLAN distribution and access layers. The JITC tested the devices that are bolded and underlined. The other devices listed that are not bolded or underlined are in the same family series as the SUT were not tested; however, they utilize the same OS software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes.

2 This interface is not offered by the SUT. This is not a required interface for a core, distribution, or access switch.

3 The SUT does not support auto-negotiation at 10/100 Mbps for ID number 8 depicted in Table 2. However, the SUT does support auto-negotiation with 1 Gbps fiber Small Form Factor Pluggables (SFPs). This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.5, which was released in May of 2009.

4 The SUT only supports force mode on 10/100/1000 copper Dense Port Concentrators Ethernet (DPCE) for ID number 9 depicted in Table 2. This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.4, which was released in February of 2009.

5 The SUT does not support RFC 4443 for the ICMPv6 requirement for ID number 67 depicted in Table 2. The SUT meets the previous ICMPv6 RFC 2463. This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they will comply in 1 January 2012 with a software update.

6 The SUT does not meet the 20 ms failover requirement for ID number 44 depicted in Table 2. The failover time with MPLS enabled was from 27.81 ms to 58.23 ms. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.

7 The SUT does not meet the following RFCs for the MPLS requirement for ID number 45 depicted in Table 2: 3479, 4003, 4328, 4872, 4873, 4874, 4974, 5129, and 5331. The SUT partially met the following RFCs for the MPLS requirement for ID number 45 depicted in Table 2: 4447, 3479, and 3036. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.

8 The SUT does not support RFC 4382 for the MPLS Layer 3 VPN requirement for ID number 46 depicted in Table 2. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.

9 Security testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, Reference (e).

LEGEND:

802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps (125 Mbps)	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices
802.3ae	10 Gbps Ethernet		
802.3i	10BaseT Mbps over twisted pair		
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FRs	Functional Requirements
802.3z	Gigabit Ethernet Standard	Gbps	Gigabits per second
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet	ICMPv6	Internet Control Message Protocol for IPv6
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet	ID	Identification
100BaseFX	100 Mbps Ethernet over fiber	IEEE	Institute of Electrical and Electronics Engineers
1000BaseFX	1000 Mbps Ethernet over fiber	IPv6	Internet Protocol version 6
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	JITC	Joint Interoperability Test Command
10GBaseX	10000 Mbps Ethernet over Category 5 Twisted Pair Copper	Mbps	Megabits per second
A	Access	MPLS	Multiprotocol Label Switching
ASLAN	Assured Services Local Area Network	ms	millisecond
C	Conditional	OS	Operating System
Co	core	POA&M	Plan of Action and Milestones
CRs	Capability Requirements	R	Required
D	distribution	RFC	Request for Comments
DISA	Defense Information Systems Agency	SUT	System Under Test
DoD	Department of Defense	TIA	Telecommunications Industry Association
EIA	Electronic Industries Alliance	UCR	Unified Capabilities Requirements
		UTP	Unshielded Twisted Pair
		VPN	Virtual Private Network

Table 2. SUT Capability and Functional Requirements

ID	Requirement (See note.)		UCR Reference
1	ASLAN components can have no single point of failure for >96 users for C2 and Special C2 users. Non-ASLAN components can have a single point of failure for C2(R) and non-C2 users. (R)		5.3.1.2.1, 5.3.1.7.7
2	Non-blocking of any voice or video traffic at 50%. (R)		5.3.1.3
3	Maximum of 1 ms of jitter for all ASLAN components. (R)		5.3.1.3
4	Maximum of 0.02% packet loss for core and distribution layer components and 0.01% for access layer components. (R)		5.3.1.3
5	Maximum of 2 ms latency for core and distribution layer components and 2 ms for access layer components. (R)		5.3.1.3
6	100 Mbps IAW IEEE 802.3u and 1 Gbps IAW IEEE 802.3z for core and distribution layer components and 10 Mbps IAW IEEE 802.3i and 100 Mbps IAW IEEE 802.3u for access layer components. (R)		5.3.1.3.1
7	Force mode and auto-negotiation IAW IEEE 802.3, filtering IAW RFC 1812, and flow control IAW IEEE 802.3x. (R)		5.3.1.3.2
8	Port Parameter Requirements	Auto-negotiation IAW IEEE 802.3. (R)	5.3.1.3.2
9		Force mode IAW IEEE 802.3. (R)	
10		Flow control IAW IEEE 802.3x. (R)	
11		Filtering IAW RFC 1812. (R)	
12		Link Aggregation IAW IEEE 802.3ad (output/egress ports only). (R)	
13		Spanning Tree Protocol IAW IEEE 802.1D. (R)	
14		Multiple Spanning Tree IAW IEEE 802.1s. (R)	
15		Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w. (R)	
16	LACP link Failover and Link Aggregation IAW IEEE 802.3ad (uplink ports only). (R)		5.3.1.3.2, 5.3.1.7.7.1
17	Class of Service Marking: Layer 3 DSCPs IAW RFC 2474. (R) Layer 2 3-bit user priority field of the IEEE 802.1Q 2-byte TCI field. (C)		5.3.1.3.3
18	VLAN Capabilities IAW IEEE 802.1Q. (R)		5.3.1.3.4
19	Protocols IAW DISR profile (IPv4 and IPv6). IPv4 (R: LAN Switch, Layer 2 Switch): IPv6 (R: LAN Switch, C: Layer 2 Switch). Note: Layer 2 switch is required to support only RFC 2460, 5095, 2464, and be able to queue packets based on DSCPs in accordance with RFC 2474.		5.3.1.3.5
20	QoS Features	Shall support minimum of 4 queues. (R)	5.3.1.3.6
21		Must be able to assign VLAN tagged packets to a queue. (R)	
22		Support DSCP PHBs per RFCs 2474, 2494, 2597, 2598, and 3246. (R: LAN Switch). Note: Layer 2 switch is required to support RFC 2474 only.	
23		Support a minimum of one of the following: Weighted Fair Queuing (WFQ) IAW RFC 3662, Priority Queuing (PQ) IAW RFC 1046, or Class-Based WFQ IAW RFC 3366. (R)	
24	Network Monitoring	Must be able to assign a bandwidth or percent of traffic to any queue. (R)	5.3.1.3.7
25		SNMP IAW RFC's 1157, 2206, 3410, 3411, 3412, 3413, and 3414. (R)	
26		SNMP traps IAW RFC1215. (R)	
27	Remote monitoring IAW RFC1281 and Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. (R)		
28	Product Requirements Summary IAW UCR2008 Table 5.3.1-5. (R)		5.3.1.3.9
29	E2E Performance (Voice)	No more than 5 ms Latency over any 5-minute period measured under congestion. (R)	5.3.1.4.1
		No more than 3 ms Jitter over any 5-minute period measured under congestion. (R)	
		Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	
30	E2E Performance (Video)	No more than 30 ms Latency over any 5-minute period measured under congestion. (R)	5.3.1.4.2
		No more than 30 ms Jitter over any 5-minute period measured under congestion. (R)	
		Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	
31	E2E Performance (Data)	No more than 50 ms Latency over any 5-minute period measured under congestion (R)	5.3.1.4.3
		Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	
32	LAN Network Management	Configuration Control for ASLAN and non-ASLAN. (R)	5.3.1.6.1
33		Operational Controls for ASLAN and non-ASLAN. (R)	5.3.1.6.2
34		Performance Monitoring for ASLAN and non-ASLAN. (R)	5.3.1.6.3
35		Alarms for ASLAN and non-ASLAN. (R)	5.3.1.6.4
36		Reporting for ASLAN and non-ASLAN. (R)	5.3.1.6.5
37	Redundancy	Redundant Power Supplies. (Required on standalone redundant products.)	5.3.1.7.7
38		Chassis Failover. (Required on standalone redundant products.)	
39		Switch Fabric Failover. (Required on standalone redundant products.)	
40		Non-LACP Link Failover.(R)	
41		Fiber Blade Failover. (R)	
42		Stack Failover. (C) (Required if the stack supports more than 96 users.)	
43		CPU (routing engine) blade Failover. (R)	
44	MPLS	MPLS May not add measurable Loss or Jitter to system. (C)	5.3.1.8.4.1
45		MPLS Conforms to RFCs in Table 5.3.1-14. (C)	5.3.1.8.4.1
46		MPLS Support L2 and L3 VPNs. (C)	5.3.1.8.4.2.1 /2

Table 2. SUT Capability and Functional Requirements (continued)

ID	Requirement (See note.)		UCR Reference
47	IPv6 Product Requirements: Dual Stack for IPv4 and IPv6 IAW RFC 4213 if routing functions are supported. (C)		5.3.5.4
48	IPv6 System Requirements	Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported. (C)	5.3.5.4
49		Support IPv6 packets over Ethernet IAW RFC2464. (R)	5.3.5.4
50		Support MTU discovery IAW RFC 1981 if routing functions are supported. (C)	5.3.5.4.1
51		Support a minimum MTU of 1280 IAW RFCs 2460 and 5095. (R)	5.3.5.4.1
52		Shall support IPv6 addresses IAW RFC4291. (R)	5.3.5.4.3
53		Shall support IPv6 scoped addresses IAW RFC4007. (R)	5.3.5.4.3
54		if routing functions are supported: If DHCP is supported must be IAW RFC3315, if DHCPv6 is supported it shall be IAW RFC 3313. (C)	5.3.5.4.4
55	IPv6 Router Advertisements	If the system supports routing functions, the system shall inspect valid router advertisements sent by other routers and verify that the routers are advertising consistent information on a link and shall log any inconsistent router advertisements, and shall prefer routers that are reachable over routers whose reachability is suspect or unknown (C).	5.3.5.4.5.2
56		If the system supports routing functions, the system shall include the MTU value in the router advertisement message for all links in accordance with RFC 2461 and RFC 4861. (C)	
57		IPv6 Neighbor Discovery: The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	
58	IPv6 Neighbor Discovery	if routing functions are supported: Neighbor discovery IAW RFCs 2461 and 4861. (C)	5.3.5.4.5
59		The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	
60		The system shall set the override flag bit in the neighbor advertisement message to “1” if the message is not an anycast address or a unicast address for which the system is providing proxy service. (R)	
61	IPv6 SLAAC and Manual Address Assignment	If the system supports stateless IP address Auto-configuration, the system shall support IPv6 SLAAC for interfaces supporting UC functions in accordance with RFC 2462 and RFC 4862.(C)	5.3.5.4.6
62		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the function to be enabled and disabled. (C)	
63		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the “managed address configuration” flag and the “other stateful configuration” flag to always be set and not perform stateless auto-configuration. (C)	
64		If the product supports stateless IP address auto-configuration including those provided for the commercial market, the DAD shall be disabled in accordance with RFC 2462 and RFC 4862.(C)	
65		The system shall support manual assignment of IPv6 addresses. (R)	
66		If the system provides routing functions, the system shall default to using the “managed address configuration” flag and the “other stateful flag” set to TRUE in their router advertisements when stateful auto-configuration is implemented. (C)	
67	IPv6 ICMP	The system shall support the ICMPv6 as described in RFC 4443. (R)	5.3.5.4.7
68		The system shall have a configurable rate limiting parameter for rate limiting the forwarding of ICMP messages. (R)	
69		The system shall support the capability to enable or disable the ability of the system to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion. (R) Required if LS supports routing functions.	
70		The system shall support the enabling or disabling of the ability to send an Echo Reply message in response to an Echo Request message sent to an IPv6 multicast or anycast address (C). Required if LS supports routing functions.	
71		The system shall validate ICMPv6 messages, using the information contained in the payload, prior to acting on them (C). Required if LS supports routing functions.	
72	IPv6 Routing Functions	If the system supports routing functions, the system shall support the OSPF for IPv6 as described in RFC 2740 (C).	5.3.5.4.8
73		If the system supports routing functions, the system shall support securing OSPF with Internet Protocol Security (IPSec) as described for other IPSec instances in UCR 2008, Section 5.4 (C).	
74		If the system supports routing functions, the system shall support OSPF for IPv6 as described in RFC 2740, router to router integrity using IP authentication header with HMAC-SHA1-96 with ESP and AH as described in RFC 2404, shall support OSPFv3 IAW RFC 4552 (C).	
75		If the system supports routing functions, the system shall support the Multicast Listener Discovery (MLD) process as described in RFC 2710 and extended in RFC 3810 (C).	
76	Site Requirements	Engineering Requirements: Physical Media for ASLAN and non-ASLAN. (R) (Site requirement)	5.3.1.7.1
77		Battery Back up two hours for non-ASLAN components and eight hours for ASLAN components. (R) (Site requirement)	5.3.1.7.5
78		Availability of 99.999 percent (Special C2), and 99.997 percent (C2) for ASLAN (R), and 99.9 percent (non-C2 and C2(R) for non-ASLAN. (R) (Site requirement)	5.3.1.7.6

Table 2. SUT Capability and Functional Requirements (continued)

ID	Requirement (See note.)				UCR Reference
79	IA Security requirements	Port-Based access Control IAW IEEE 802.1x (R)			5.3.1.3.2
80		Secure methods for network configuration. SSH2 instead of Telnet and support RFCs 4251-4254. Must use HTTPS instead of http, and support RFCs 2660 and 2818 for ASLAN and non-ASLAN. (R)			5.3.1.6
81		Security (R)			5.3.1.3.8
82		Must meet IA requirements IAW UCR 2008 Section 5.4 for ASLAN and non-ASLAN. (R)			5.3.1.5
NOTE: All requirements are for core, distribution, and access layer components unless otherwise specified.					
LEGEND:					
ASLAN	Assured Services Local Area Network	HTTPS	Hyper Text Transfer Protocol, Secure	MTU	Maximum Transmission Unit
C	Conditional	IA	Information Assurance	OSPF	Open Shortest Path First
C2	Command and Control	IAW	In Accordance with	OSPFv3	Open Shortest Path First Version 3
C2(R)	Command and Control ROUTINE only	ICMP	Internet Control Message Protocol	PHB	Per Hop Behavior
CPU	Central Processing Unit	ICMPv6	Internet Control Message Protocol for IPv6	QoS	Quality of Service
DAD	Duplicate Address Detection			R	Required
DHCP	Dynamic Host Configuration Protocol	ID	Identification	RFC	Request for Comments
DHCPv6	Dynamic Host Configuration Protocol for IPv6	IEEE	Institute of Electrical and Electronics Engineers	SLAAC	Stateless Auto Address Configuration
DISR	Department of Defense Information Technology Standards Registry	IPv4	Internet Protocol version 4	SNMP	Simple Network Management Protocol
		IPv6	Internet Protocol version 6	SSH2	Secure Shell Version 2
		LACP	Link Aggregation Control Protocol	SUT	System Under Test
DSCP	Differentiated Services Code Point	LAN	Local Area Network	TCI	Tag Control Information
E2E	End-to-End	LS	LAN Switch	UC	Unified Capabilities
HMAC	Hash-based Message Authentication Code	Mbps	Megabits per second	UCR	Unified Capabilities Requirements
		MPLS	Multiprotocol Label Switching	VLAN	Virtual Local Area Network
HTTP	Hypertext Transfer Protocol	ms	millisecond	VPN	Virtual Private Network


5. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: ucco@disa.mil.

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6. The JITC point of contact is Mr. Khoa Hoang, DSN 879-4376, commercial (520) 538-4376, FAX DSN 879-4347, or e-mail to khoa.hoang@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The Tracking Number for this SUT is 0922203.

FOR THE COMMANDER:

2 Enclosures a/s


for RICHARD A. MEADOR
Chief
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

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Department of the Army, Office of the Secretary of the Army, DA-OSA CIO/G-6 ASA (ALT),
SAIS-IOQ

U.S. Marine Corps MARCORSYSCOM, SIAT, MJI Division I

DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

Office of Assistant Secretary of Defense (NII)/DOD CIO

U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities
Division, J68

Defense Information Systems Agency, GS23

ADDITIONAL REFERENCES

- (c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008 Change 1," 22 January 2010
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment Report of MX 960/480/240 Juniper Operating System (JUNOS) 9.3 (Tracking Number 0922203)," 29 June 2010

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. Juniper MX Series with Juniper Operating System (JUNOS) 9.3 R.4.4; hereinafter referred to as the system under test (SUT).

2. PROPONENT. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC).

3. PROGRAM MANAGER. Gary Kitsmiller, AMSEL-IE-IS, Building 53301 Arizona Street, Fort Huachuca, Arizona, 85613-5300, e-mail: gary.kitsmiller@us.army.mil.

4. TESTER. Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.

5. SYSTEM UNDER TEST DESCRIPTION. The SUT is used to transport voice signaling and media as part of an overall Voice over Internet Protocol (VoIP) system. The SUT provides availability, security, and Quality of Service (QoS) to meet the operational requirements of the network and Assured Services for the warfighter. The Juniper MX480 is certified as a core, distribution, and access switch. The Juniper MX240 is certified as a distribution and access switch. The SUT is interoperable for joint use with other Assured Services Local Area Network (ASLAN) components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 10000/1000Base SX/LX and 10/100/1000BaseT. The Juniper MX480/MX240 with Release JUNOS 9.3 R4.4 were the systems tested; however, the Juniper MX960 employs the same software and similar hardware as the Juniper MX480. The JITC analysis determined this system to be functionally identical to the SUT for interoperability certification purposes.

6. OPERATIONAL ARCHITECTURE. The Defense Switched Network (DSN) architecture is a two-level network hierarchy consisting of DSN backbone switches and Service/Agency installation switches. Service/Agency installation switches have been authorized to extend voice services over Internet Protocol (IP) infrastructures. The Unified Capabilities Requirements (UCR) operational DSN Architecture is depicted in Figure 2-1, which depicts the relationship of the ASLAN and non-ASLAN to the DSN switch types.

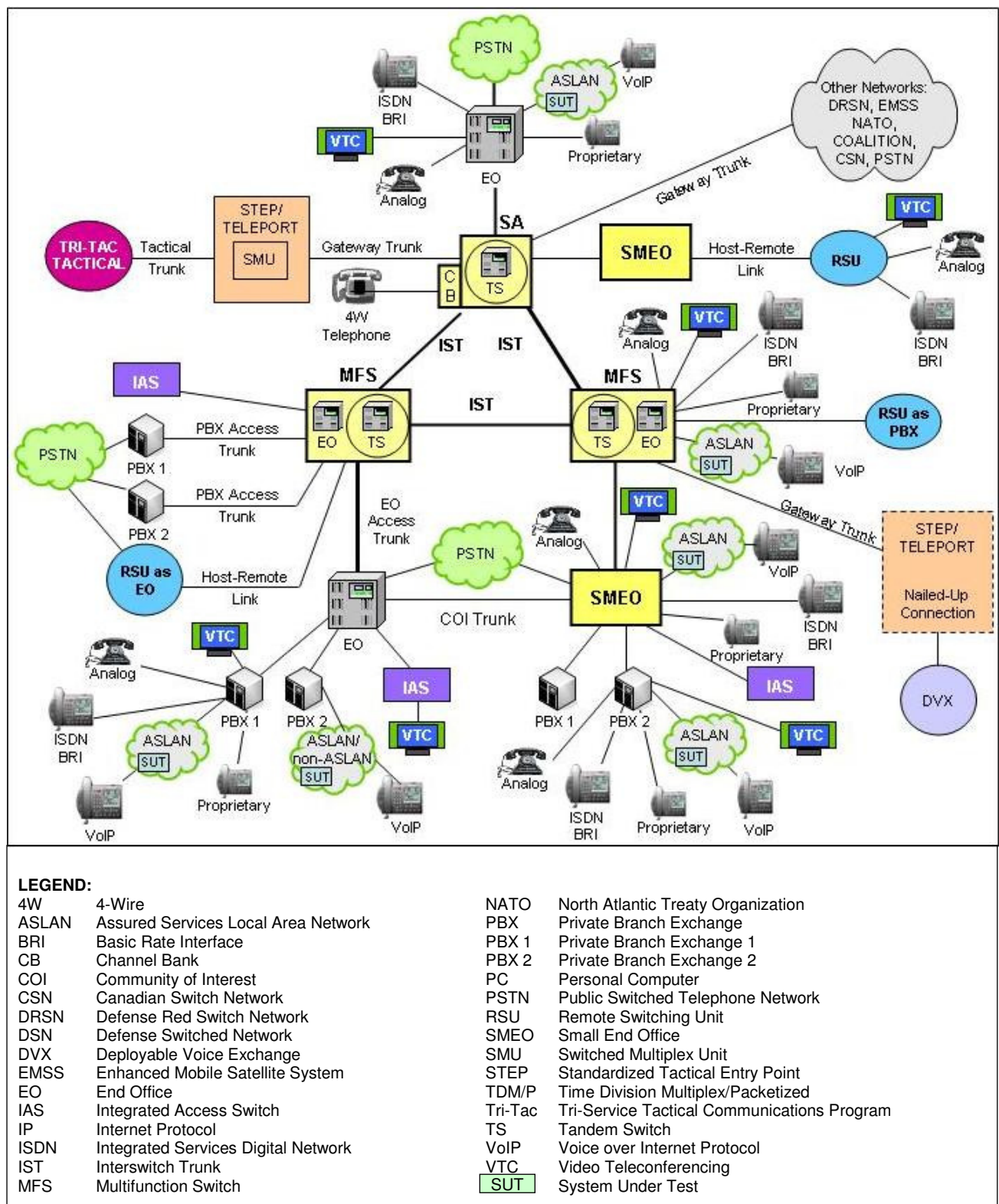


Figure 2-1. DSN Architecture

7. REQUIRED SYSTEM INTERFACES. The SUT capability and functional requirements are listed in Table 2-1. These requirements are derived from the UCR 2008, Change 1, and verified through JITC testing and review of the vendor's Letters of Compliance (LoC).

Table 2-1. SUT Capability and Functional Requirements

ID	Requirement (See note.)		UCR Reference
1	ASLAN components can have no single point of failure for >96 users for C2 and Special C2 users. Non-ASLAN components can have a single point of failure for C2(R) and non-C2 users. (R)		5.3.1.2.1, 5.3.1.7.7
2	Non-blocking of any voice or video traffic at 50%. (R)		5.3.1.3
3	Maximum of 1 ms of jitter for all ASLAN components. (R)		5.3.1.3
4	Maximum of 0.02% packet loss for core and distribution layer components and 0.01% for access layer components. (R)		5.3.1.3
5	Maximum of 2 ms latency for core and distribution layer components and 2 ms for access layer components. (R)		5.3.1.3
6	100 Mbps IAW IEEE 802.3u and 1 Gbps IAW IEEE 802.3z for core and distribution layer components and 10 Mbps IAW IEEE 802.3i and 100 Mbps IAW IEEE 802.3u for access layer components. (R)		5.3.1.3.1
7	Force mode and auto-negotiation IAW IEEE 802.3, filtering IAW RFC 1812, and flow control IAW IEEE 802.3x. (R)		5.3.1.3.2
8	Port Parameter Requirements	Auto-negotiation IAW IEEE 802.3. (R)	5.3.1.3.2
9		Force mode IAW IEEE 802.3. (R)	
10		Flow control IAW IEEE 802.3x. (R)	
11		Filtering IAW RFC 1812. (R)	
12		Link Aggregation IAW IEEE 802.3ad (output/egress ports only). (R)	
13		Spanning Tree Protocol IAW IEEE 802.1D. (R)	
14		Multiple Spanning Tree IAW IEEE 802.1s. (R)	
15		Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w. (R)	
16	LACP link Failover and Link Aggregation IAW IEEE 802.3ad (uplink ports only). (R)		5.3.1.3.2, 5.3.1.7.7.1
17	Class of Service Marking: Layer 3 DSCPs IAW RFC 2474. (R) Layer 2 3-bit user priority field of the IEEE 802.1Q 2-byte TCI field. (C)		5.3.1.3.3
18	VLAN Capabilities IAW IEEE 802.1Q. (R)		5.3.1.3.4
19	Protocols IAW DISR profile (IPv4 and IPv6). IPv4 (R: LAN Switch, Layer 2 Switch): IPv6 (R: LAN Switch, C: Layer 2 Switch). Note: Layer 2 switch is required to support only RFC 2460, 5095, 2464, and be able to queue packets based on DSCPs in accordance with RFC 2474.		5.3.1.3.5
20	QoS Features	Shall support minimum of 4 queues. (R)	5.3.1.3.6
21		Must be able to assign VLAN tagged packets to a queue. (R)	
22		Support DSCP PHBs per RFCs 2474, 2494, 2597, 2598, and 3246. (R: LAN Switch). Note: Layer 2 switch is required to support RFC 2474 only.	
23		Support a minimum of one of the following: Weighted Fair Queuing (WFQ) IAW RFC 3662, Priority Queuing (PQ) IAW RFC 1046, or Class-Based WFQ IAW RFC 3366. (R)	
24		Must be able to assign a bandwidth or percent of traffic to any queue. (R)	
25	Network Monitoring	SNMP IAW RFC's 1157, 2206, 3410, 3411, 3412, 3413, and 3414. (R)	5.3.1.3.7
26		SNMP traps IAW RFC1215. (R)	
27		Remote monitoring IAW RFC1281 and Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. (R)	
28	Product Requirements Summary IAW UCR2008 Table 5.3.1-5. (R)		5.3.1.3.9
29	E2E Performance (Voice)	No more than 5 ms Latency over any 5-minute period measured under congestion. (R) No more than 3 ms Jitter over any 5-minute period measured under congestion. (R) Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	5.3.1.4.1
30	E2E Performance (Video)	No more than 30 ms Latency over any 5-minute period measured under congestion. (R) No more than 30 ms Jitter over any 5-minute period measured under congestion. (R) Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	5.3.1.4.2
31	E2E Performance (Data)	No more than 50 ms Latency over any 5-minute period measured under congestion (R) Packet loss not to exceed engineered (queuing) parameters over any 5-minute period under congestion. (R)	5.3.1.4.3

Table 2-1. SUT Capability and Functional Requirements (continued)

ID	Requirement (See note.)		UCR Reference
32	LAN Network Management	Configuration Control for ASLAN and non-ASLAN. (R)	5.3.1.6.1
33		Operational Controls for ASLAN and non-ASLAN. (R)	5.3.1.6.2
34		Performance Monitoring for ASLAN and non-ASLAN. (R)	5.3.1.6.3
35		Alarms for ASLAN and non-ASLAN. (R)	5.3.1.6.4
36		Reporting for ASLAN and non-ASLAN. (R)	5.3.1.6.5
37	Redundancy	Redundant Power Supplies. (Required on standalone redundant products.)	5.3.1.7.7
38		Chassis Failover. (Required on standalone redundant products.)	
39		Switch Fabric Failover. (Required on standalone redundant products.)	
40		Non-LACP Link Failover.(R)	
41		Fiber Blade Failover. (R)	
42		Stack Failover. (C) (Required if the stack supports more than 96 users.)	
43		CPU (routing engine) blade Failover. (R)	
44	MPLS	MPLS May not Add measurable Loss or Jitter to system. (C)	5.3.1.8.4.1
45		MPLS Conforms to RFCs in Table 5.3.1-14. (C)	5.3.1.8.4.1
46		MPLS Support L2 and L3 VPNs. (C)	5.3.1.8.4.2.1/2
47	IPv6 Product Requirements: Dual Stack for IPv4 and IPv6 IAW RFC 4213 if routing functions are supported. (C)		5.3.5.4
48	IPv6 System Requirements	Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported. (C)	5.3.5.4
49		Support IPv6 packets over Ethernet IAW RFC2464. (R)	5.3.5.4
50		Support MTU discovery IAW RFC 1981 if routing functions are supported. (C)	5.3.5.4.1
51		Support a minimum MTU of 1280 IAW RFCs 2460 and 5095. (R)	5.3.5.4.1
52		Shall support IPv6 addresses IAW RFC4291. (R)	5.3.5.4.3
53		Shall support IPv6 scoped addresses IAW RFC4007. (R)	5.3.5.4.3
54		if routing functions are supported: If DHCP is supported must be IAW RFC3315, if DHCPv6 is supported it shall be IAW RFC 3313. (C)	5.3.5.4.4
55	IPv6 Router Advertisements	If the system supports routing functions, the system shall inspect valid router advertisements sent by other routers and verify that the routers are advertising consistent information on a link and shall log any inconsistent router advertisements, and shall prefer routers that are reachable over routers whose reachability is suspect or unknown (C).	5.3.5.4.5.2
56		If the system supports routing functions, the system shall include the MTU value in the router advertisement message for all links in accordance with RFC 2461 and RFC 4861. (C)	
57		IPv6 Neighbor Discovery: The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	
58	IPv6 Neighbor Discovery	if routing functions are supported: Neighbor discovery IAW RFCs 2461 and 4861. (C)	5.3.5.4.5
59		The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R)	
60		The system shall set the override flag bit in the neighbor advertisement message to "1" if the message is not an anycast address or a unicast address for which the system is providing proxy service. (R)	
61	IPv6 SLAAC and Manual Address Assignment	If the system supports stateless IP address Auto-configuration, the system shall support IPv6 SLAAC for interfaces supporting UC functions in accordance with RFC 2462 and RFC 4862.(C)	5.3.5.4.6
62		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the function to be enabled and disabled. (C)	
63		If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the "managed address configuration" flag and the "other stateful configuration" flag to always be set and not perform stateless auto-configuration. (C)	
64		If the product supports stateless IP address auto-configuration including those provided for the commercial market, the DAD shall be disabled in accordance with RFC 2462 and RFC 4862.(C)	
65		The system shall support manual assignment of IPv6 addresses. (R)	
66		If the system provides routing functions, the system shall default to using the "managed address configuration" flag and the "other stateful flag" set to TRUE in their router advertisements when stateful auto-configuration is implemented. (C)	

Table 2-1. SUT Capability and Functional Requirements (continued)

ID	Requirement (See note.)		UCR Reference		
67	IPv6 ICMP	The system shall support the ICMPv6 as described in RFC 4443. (R)	5.3.5.4.7		
68		The system shall have a configurable rate limiting parameter for rate limiting the forwarding of ICMP messages. (R)			
69		The system shall support the capability to enable or disable the ability of the system to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion. (R) Required if LS supports routing functions.			
70		The system shall support the enabling or disabling of the ability to send an Echo Reply message in response to an Echo Request message sent to an IPv6 multicast or anycast address (C). Required if LS supports routing functions.			
71		The system shall validate ICMPv6 messages, using the information contained in the payload, prior to acting on them (C). Required if LS supports routing functions.			
72	IPv6 Routing Functions	If the system supports routing functions, the system shall support the OSPF for IPv6 as described in RFC 2740 (C).	5.3.5.4.8		
73		If the system supports routing functions, the system shall support securing OSPF with Internet Protocol Security (IPSec) as described for other IPSec instances in UCR 2008, Section 5.4 (C).			
74		If the system supports routing functions, the system shall support OSPF for IPv6 as described in RFC 2740, router to router integrity using IP authentication header with HMAC-SHA1-96 with ESP and AH as described in RFC 2404, shall support OSPFv3 IAW RFC 4552 (C).			
75		If the system supports routing functions, the system shall support the Multicast Listener Discovery (MLD) process as described in RFC 2710 and extended in RFC 3810 (C).			
76	Site Requirements	Engineering Requirements: Physical Media for ASLAN and non-ASLAN. (R) (Site requirement)	5.3.1.7.1		
77		Battery Back up two hours for non-ASLAN components and eight hours for ASLAN components. (R) (Site requirement)	5.3.1.7.5		
78		Availability of 99.999 percent (Special C2), and 99.997 percent (C2) for ASLAN (R), and 99.9 percent (non-C2 and C2(R) for non-ASLAN. (R) (Site requirement)	5.3.1.7.6		
79	IA Security requirements	Port-Based access Control IAW IEEE 802.1x (R)	5.3.1.3.2		
80		Secure methods for network configuration. SSH2 instead of Telnet and support RFCs 4251-4254. Must use HTTPS instead of http, and support RFCs 2660 and 2818 for ASLAN and non-ASLAN. (R)	5.3.1.6		
81		Security (R)	5.3.1.3.8		
82		Must meet IA requirements IAW UCR 2008 Section 5.4 for ASLAN and non-ASLAN. (R)	5.3.1.5		
NOTE: All requirements are for core, distribution, and access layer components unless otherwise specified.					
LEGEND:					
ASLAN	Assured Services Local Area Network	HTTPS	Hyper Text Transfer Protocol, Secure	MTU	Maximum Transmission Unit
C	Conditional	IA	Information Assurance	OSPF	Open Shortest Path First
C2	Command and Control	IAW	In Accordance with	OSPFv3	Open Shortest Path First Version 3
C2(R)	Command and Control ROUTINE only	ICMP	Internet Control Message Protocol	PHB	Per Hop Behavior
CPU	Central Processing Unit	ICMPv6	Internet Control Message Protocol for IPv6	QoS	Quality of Service
DAD	Duplicate Address Detection	ID	Identification	R	Required
DHCP	Dynamic Host Configuration Protocol	IEEE	Institute of Electrical and Electronics Engineers	RFC	Request for Comments
DHCPv6	Dynamic Host Configuration Protocol for IPv6	IPv4	Internet Protocol version 4	SLAAC	Stateless Auto Address Configuration
DISR	Department of Defense Information Technology Standards Registry	IPv6	Internet Protocol version 6	SNMP	Simple Network Management Protocol
DSCP	Differentiated Services Code Point	LACP	Link Aggregation Control Protocol	SSH2	Secure Shell Version 2
E2E	End-to-End	LAN	Local Area Network	SUT	System Under Test
HMAC	Hash-based Message Authentication Code	LS	LAN Switch	TCI	Tag Control Information
HTTP	Hypertext Transfer Protocol	Mbps	Megabits per second	UC	Unified Capabilities
		MPLS	Multiprotocol Label Switching	UCR	Unified Capabilities Requirements
		ms	millisecond	VLAN	Virtual Local Area Network
				VPN	Virtual Private Network

8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC's Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. A notional diagram of the SUT within an ASLAN VoIP architecture is depicted in Figure 2-2 and the Notional non-ASLAN VoIP architecture is depicted in Figure 2-3. The notional ASLAN and non-ASLAN combined VoIP architecture is depicted in Figure 2-4. The ASLAN test configuration used to test the SUT in a homogeneous network is depicted in Figure 2-5, and the heterogeneous test network configurations are depicted in Figures 2-6 and 2-7.

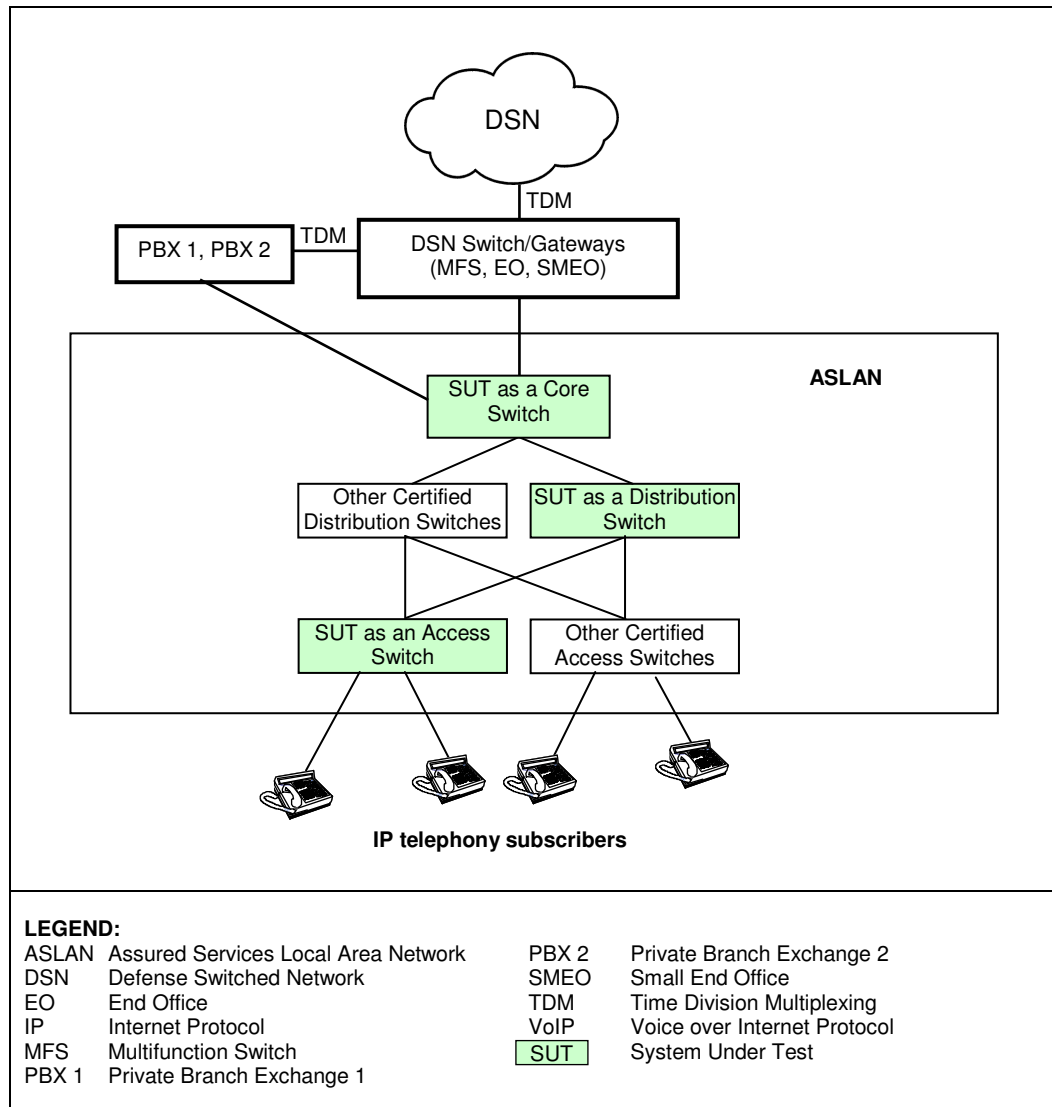


Figure 2-2. SUT Notional ASLAN VoIP Architecture

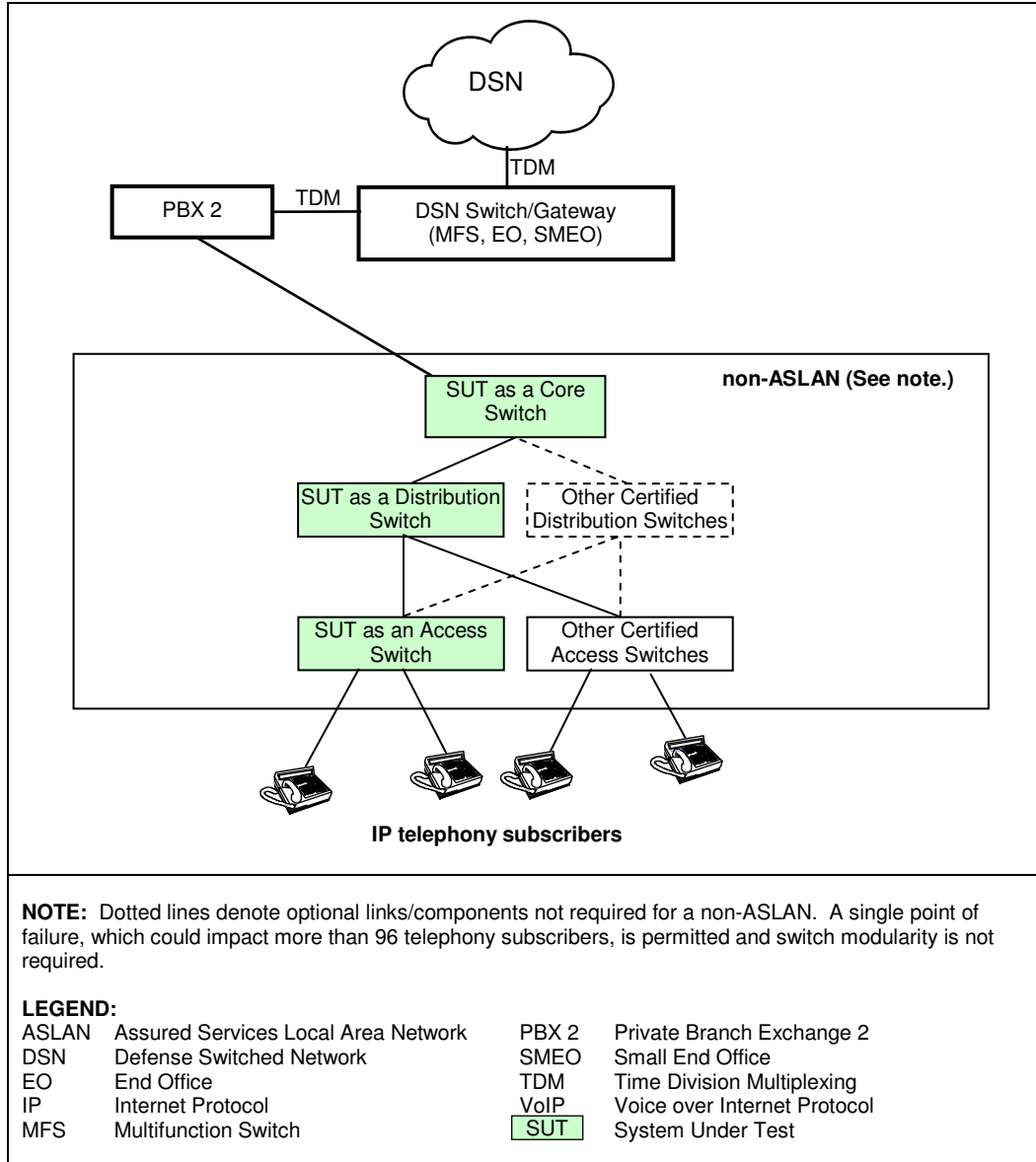


Figure 2-3. SUT Notional Non-ASLAN VoIP Architecture

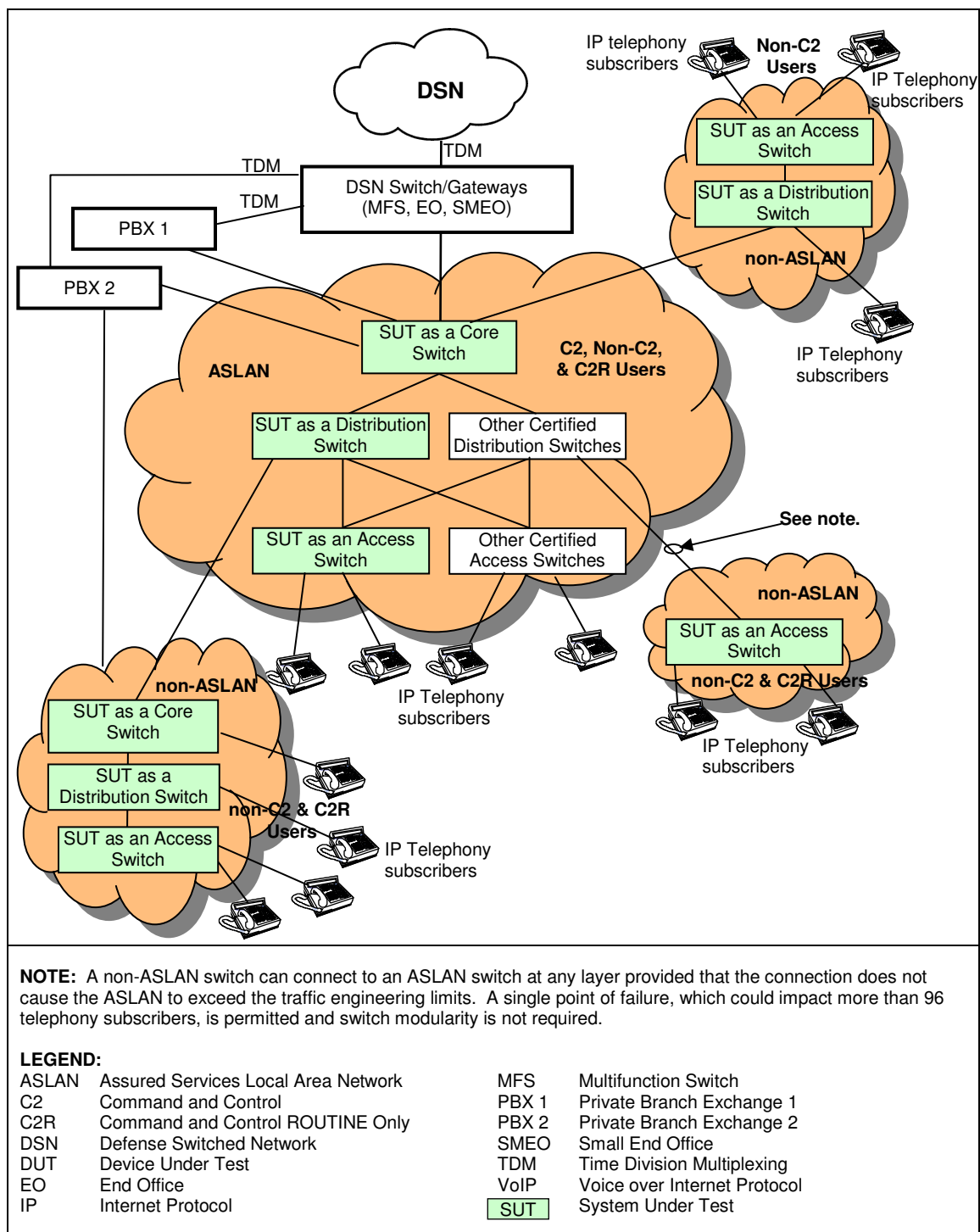


Figure 2-4. SUT Notional ASLAN and non-ASLAN Combined VoIP Architecture

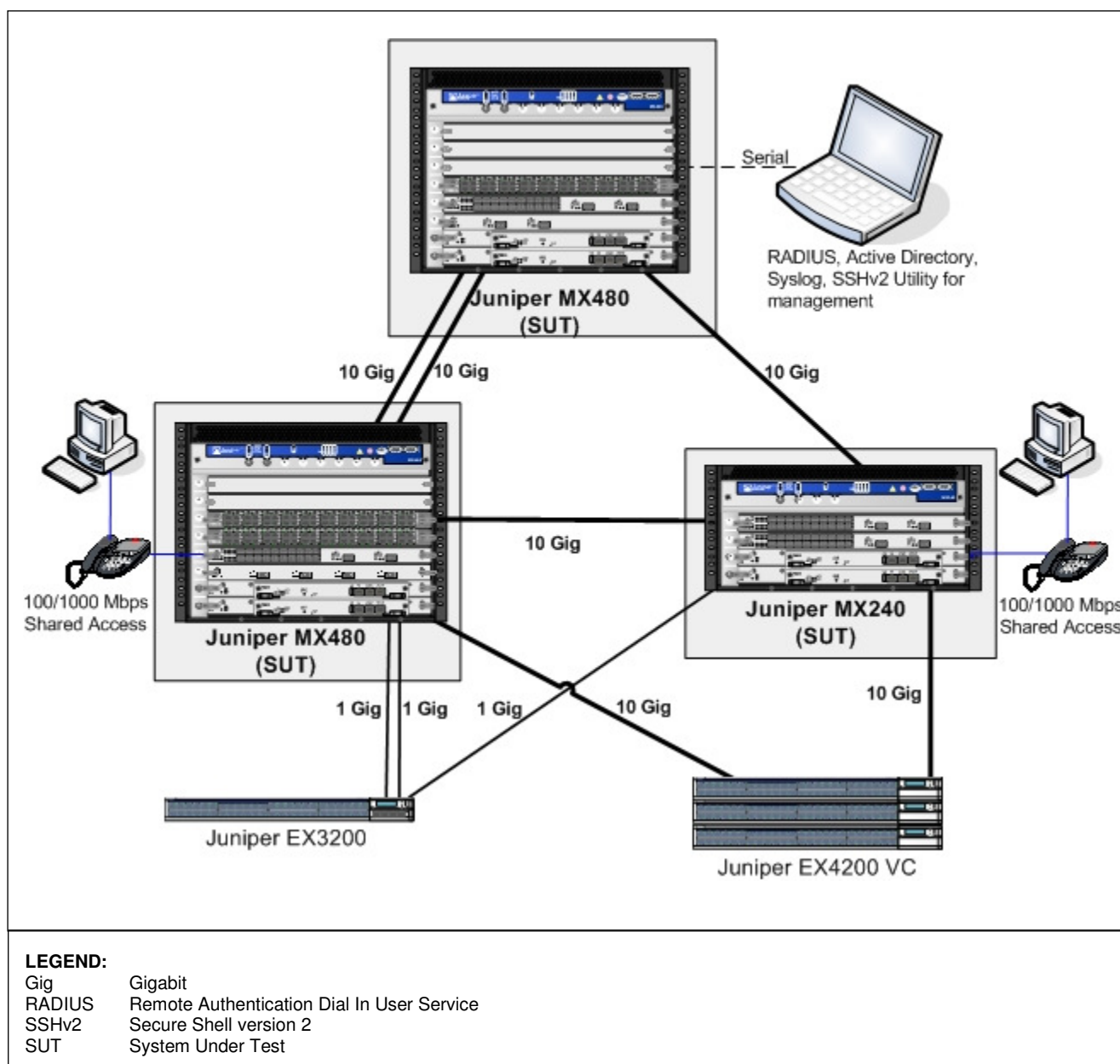


Figure 2-5. SUT Homogenous Test Configuration

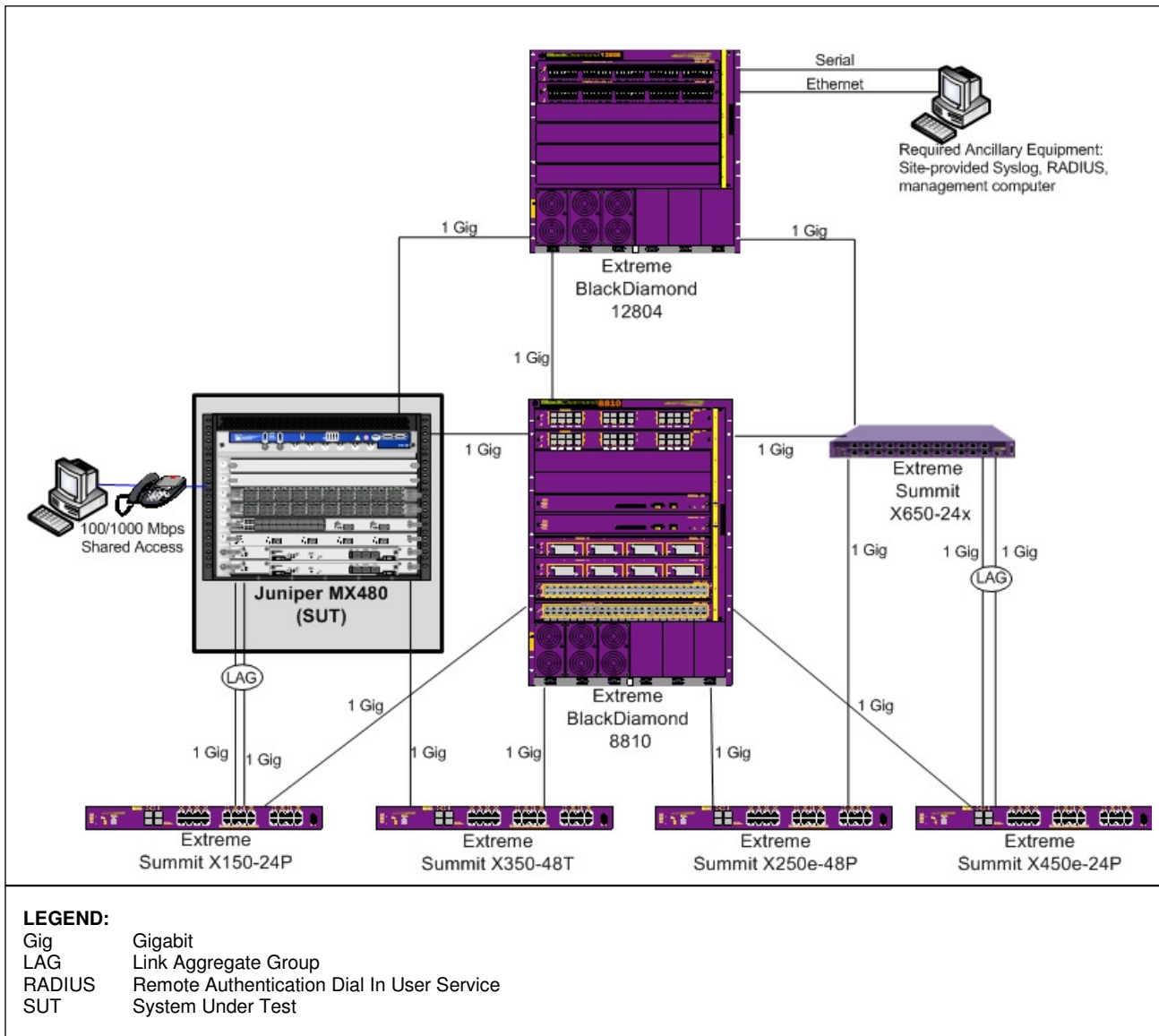


Figure 2-6. SUT Heterogeneous Test Configuration with Extreme

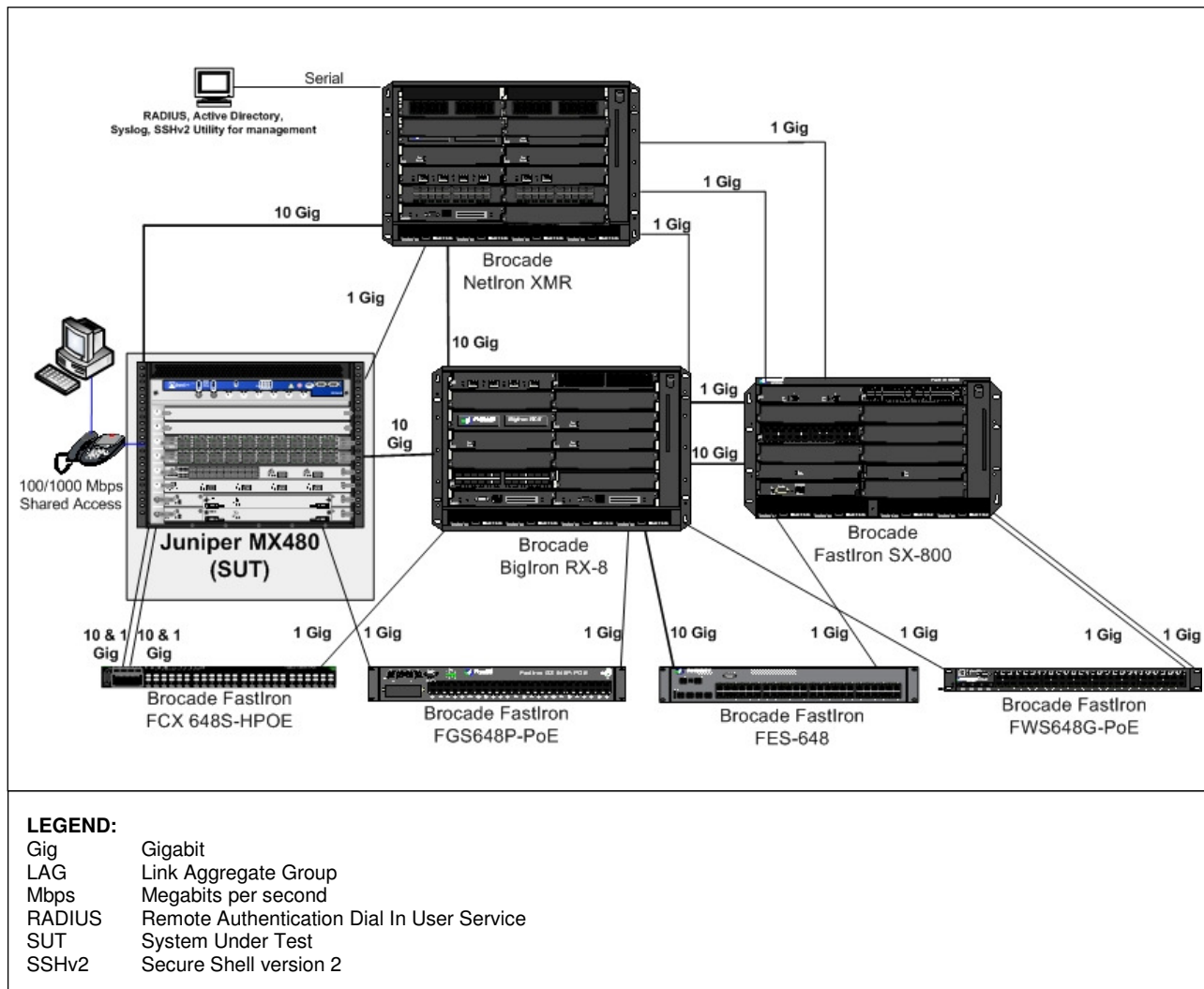


Figure 2-7. SUT Heterogeneous Test Configuration with Brocade

9. SYSTEM CONFIGURATIONS. Table 2-2 provides the system configurations, hardware, and software components tested with the SUT. The SUT is certified with other IP systems listed on the UC APL that are certified for use with an ASLAN or non-ASLAN.

Table 2-2. Tested System Configuration

System Name	Release
Extreme BlackDiamond 8810	12.3.1
Extreme BlackDiamond 12804	12.3.1
Extreme Summit X650-24x	12.3.1
Extreme Summit X450e-24P	12.3.1
Extreme Summit X250e-48P	12.3.1
Extreme Summit X350-48T	12.3.1
Extreme Summit X150-24P	12.3.1

Table 2-2. Tested System Configuration (continued)

System Name		Release		
Brocade NetIron XMR		4.0.06		
Brocade BigIron RX-8		2.7.01		
Brocade FastIron SX-800		5.0.00		
Brocade FastIron FES-648		4.3.02		
Brocade FastIron FGS-648P-PoE		5.0.00		
Brocade FastIron FWS-648G-PoE		4.3.02		
Brocade FastIron FCX 648S-HPOE		7.0		
SUT (See note.)	Function	Release	Sub-component (See note.)	Description
<u>Juniper MX480/MX960</u>	Core, Distribution, Access	JUNOS 9.3 v4.4	<u>RE-S-2000</u>	Routing Engine Series 2000
			<u>RE-S-1300</u>	Routing Engine Series 1300
			<u>MX SCB</u>	System Control Boards (Switch Fabric)
			<u>DPCE-R-4XGE-XFP</u>	4-port 10 Gigabit Ethernet layer 2 and 3 capable
			DPCE-X-4XGE-XFP	4-port 10 Gigabit Ethernet layer 2+ capable
			DPCE-R-Q-4XGE-XFP	4-port 10 Gigabit Ethernet layer 2 and 3 capable board with enhanced queuing
			<u>DPCE-R-2XGE-XFP</u>	2-port 10 Gigabit Ethernet layer 2 and 3 capable
<u>Juniper MX240</u>	Distribution, Access		<u>DPCE-R-40GE-TX</u>	40-port 10/100/1000 Ethernet layer 2 and layer 3 capable with RJ-45
			DPCE-X-40GE-TX	40-port 10/100/1000 Ethernet layer 2+ with RJ-45
			DPCE-R-40GE-SFP	40-port 1 Gigabit Ethernet layer 2 and 3 capable
			DPCE-X-40GE-SFP	40-port 1 Gigabit Ethernet layer 2+
			DPCE-R-Q-40GE-SFP	40-port 1 Gigabit Ethernet layer 2 and 3 capable with enhanced queuing
			<u>DPCE-R-20GE-2XGE</u>	20-port 1 Gigabit Ethernet SFP and 2-port 10 Gigabit Ethernet XFP layer 2 and 3 capable
			DPCE-X-20GE-2XGE	20-port 1 Gigabit Ethernet SFP and 2-port 10 Gigabit Ethernet XFP layer 2+ capable
			DPCE-R-Q-20GE-2XGE	20-port 1 Gigabit Ethernet SFP and 2-port 10 Gigabit Ethernet XFP with enhanced queuing
NOTE: Components bolded and underlined were tested by JITC. The other components in the family series were not tested; however, they utilize the same software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes and they are also certified for joint use.				
LEGEND:				
DPCE	Dense Port Concentrators Ethernet	RE	Routing Engine	
GE	Gigabit Ethernet	S	Series	
JUNOS	Juniper Operating System	SCB	System Control Boards	
JITC	Joint Interoperability Test Command	SFP	Small Form Factor Pluggable	
Q	Queuing	SUT	System Under Test	
R	Routing	XFP	Ten Gigabit Small Form Factor Pluggable	
RJ	Registered Jack			

10. TESTING LIMITATIONS. None.

11. TEST RESULTS

a. Discussion. The SUT is certified to support DSN Assured Services over IP. If a component meets the minimum requirements for deployment in an ASLAN, it also

meets the lesser requirements for deployment in a non-ASLAN. Non-ASLANs are “commercial grade” and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. The SUT is certified for joint use deployment in a non-ASLAN for C2R and non-C2 traffic. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but are limited to originating ROUTINE precedence only. Non-ASLANs do not need to meet the availability or redundancy requirements of the C2 or Special C2 users and C2 users and Special C2 users are not authorized as subscribers on a non-ASLAN.

b. Test Conduct. The SUT was tested as a core, distribution, and switch in both homogeneous and heterogeneous ASLAN configurations and met all of the requirements with testing and/or the vendor’s LoC as outlined in the sub paragraphs below. All requirements are for core, distribution, and access layer components unless otherwise specified.

(1) The UCR 2008, Change 1, paragraphs 5.3.1.2.1, 5.3.1.7.7, 5.3.1.7.7.1, 5.3.1.7.7.2, state that ASLAN components can have no single point of failure for more than 96 users for C2 and Special C2 users. The UCR 2008, Change 1, paragraph 5.3.1.7.7, states the following Redundancy requirements. Redundancy can be met if the product itself provides redundancy internally or a secondary product is added to the ASLAN to provide redundancy to the primary product. Single-product redundancy may be met with a modular chassis that at a minimum provides the following: dual power supplies, dual processors, termination sparing, redundancy protocol, no single point of failure, and switch fabric or backplane redundancy. In the event of a component failure in the network, all calls that are active shall not be disrupted (loss of existing connection requiring redialing) and the path through the network shall be restored within five seconds. If a secondary product has been added to provide redundancy to a primary product, the failover to the secondary product must meet the same requirements. Non-ASLAN components can have a single point of failure for C2(R) and non-C2 users. All redundant components were tested. Dual power supplies were tested and the measured restoral was 0.31 seconds. Dual route engines were tested and restoral occurred in 0.19 seconds. Switch fabrics were tested and failover occurred in 1.73 seconds. The Non-LACP link failover was tested and the measured restoral was 0.019 seconds. The LACP link failover took 0.055 seconds. The SUT met all of the requirements except dual chassis single route engine failover. The dual chassis single route engine failover occurred in 6.24 seconds. The SUT must be configured with two route engines per chassis. The SUT met the restoral requirements with no loss of existing active circuits.

(2) The UCR 2008, Change 1, paragraph 5.3.1.3, states that the ASLAN infrastructure components shall meet the requirements in the subparagraphs below. The SUT was tested using 155 percent oversubscription of the total aggregate uplink bandwidth for 1 GigABIT. This included 100 percent of uplink aggregate in untagged best effort data, and 55 percent of uplink aggregate in tagged Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6) voice, video, and preferred data traffic.

(a) The SUT shall be non-blocking for a minimum of 50 percent (maximum voice and video traffic) of its maximum rated output capacity for egress ports that interconnect (trunk) the product to other products. Non-blocking is defined as the capability to send and receive 64 to 1518 byte packets at full duplex rates from ingress ports to egress ports without losing any packets. The SUT met this requirement by ensuring that higher priority tagged traffic was queued above lower priority tagged traffic and untagged best effort data.

(b) The SUT shall have the capability to transport prioritized voice packets (media and signaling) with no more than 1 millisecond (ms) jitter across all switches. All ASLAN infrastructure components shall have the capability to transport prioritized video packets (media and signaling) with no more than 10 ms jitter across all switches. The jitter shall be achievable over any five-minute period measured from ingress ports to egress ports under congested conditions. The SUT met this requirement with a measured jitter of 0 ms for voice and video packets.

(c) All core and distribution products shall have the capability to transport prioritized voice and video packets (media and signaling) with no more than 0.02 percent packet loss. Access products shall have the capability to transport prioritized voice and video packets with no more than 0.01 percent packet loss. The packet loss shall be achievable over any five-minute period measured from ingress ports to egress ports under congested conditions. The SUT met this requirement with a measured packet loss of 0.00 percent for voice and video packets.

(d) The SUT shall have the capability to transport prioritized voice packets (media and signaling), with no more than 2 ms latency. All ASLAN infrastructure components shall have the capability to transport prioritized video packets (media and signaling), with no more than 10 ms latency. The latency shall be achievable over any five-minute period measured from ingress ports to egress ports under congested conditions. The SUT met this requirement with an average of 0 ms of latency. for voice and video packets.

(3) The UCR 2008, Change 1, paragraph 5.3.1.3.1, states that, at a minimum, core and distribution products shall support the following interface rates and other rates may be provided as conditional interfaces: 100 Mbps in accordance with IEEE 802.3u and 1 Gbps in accordance with IEEE 802.3z. At a minimum, access products shall provide the following interface rates and other rates may be provided as conditional interfaces: 10 Mbps in accordance with IEEE 802.3i and 100 Mbps in accordance with IEEE 802.3u. Refer to Table 2-3 for a detailed list of interfaces that were tested. The SUT met these requirements.

Table 2-3. SUT Interface Status

Interface	Applicability			CRs/FRs (See note 1.)	Status		
	Co	D	A		Co	D	A
Network Management Interfaces for Core Layer Switches							
EIA/TIA-232 (Serial)	R	R	R	EIA/TIA-232	Met	Met	Met
IEEE 802.3i (10BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Not Tested ²		
IEEE 802.3u (100BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Met ^{3,4,5}	Met ^{3,4,5}	Met ^{3,4,5}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1, 6-15, 18-28, 31, 32-36, 48-53, 58-60, 65, 67-71	Met ^{3,4,5}	Met ^{3,4,5}	Met ^{3,4,5}
Uplink Interfaces for Core Layer Switches							
IEEE 802.3u (100BaseT UTP)	R	R	R	1-15, 16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseFX)	C	C	C	1-6, 11, 16, 18-24, 28-31, 40-41, 44-53, 55-60, 65-75	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1-16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3z (1000BaseX Fiber)	R	R	C	1-5, 8-16, 18-24, 28-31, 40, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3ae (10GBaseX)	C	C	C	1-5, 8-16, 18, 19, 40-41, 44-53, 55-60, 65-75	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
Access Interfaces for Core Layer Switches							
IEEE 802.3i (10BaseT UTP)	C	C	R	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseT UTP)	R	R	R	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3u (100BaseFX)	C	C	C	1-6, 11, 18-24, 28-31, 44-54, 58-71	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
IEEE 802.3ab (1000BaseT UTP)	C	C	C	1-15, 18-24, 28-41, 44-54, 58-71	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}	Met ^{3,4,5,6,7,8}
IEEE 802.3z (1000BaseX Fiber)	R	R	C	1-6, 11, 18-24, 28-31, 44-54, 58-71	Met ^{5,6,7,8}	Met ^{5,6,7,8}	Met ^{5,6,7,8}
Generic Requirements for all Interfaces							
Generic Requirements not associated with specific interfaces	R	R	R	30-32, 35, 36, 40, 69-71	Met	Met	Met
DoD IPv6 Profile Requirements	R	R	R	UCR Section 5.3.5.5	Met	Met	Met
Security	R	R	R	UCR Sections 5.3.1.3.8, 5.3.1.5, 5.3.1.6, and 5.4	Met ⁹	Met ⁹	Met ⁹

NOTES:

- The SUT's specific capability and functional requirement ID numbers depicted in the CRs/FRs column can be cross-referenced in Table 2. These requirements are for the following Juniper MX switch models: **MX480** and MX960, which are certified in the ASLAN core, distribution, and access layers, and the **MX240**, which is certified in the ASLAN distribution and access layers. The JITC tested the devices that are bolded and underlined. The other devices listed that are not bolded or underlined are in the same family series as the SUT were not tested; however, they utilize the same OS software and hardware and JITC analysis determined them to be functionally identical for interoperability certification purposes.
- This interface is not offered by the SUT. This is not a required interface for a core, distribution, or access switch.
- The SUT does not support auto-negotiation at 10/100 Mbps for ID number 8 depicted in Table 2. However, the SUT does support auto-negotiation with 1 Gbps fiber Small Form Factor Pluggables (SFPs). This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.5, which was released in May of 2009.
- The SUT only supports force mode on 10/100/1000 copper Dense Port Concentrators Ethernet (DPCE) for ID number 9 depicted in Table 2. This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.4, which was released in February of 2009.
- The SUT does not support RFC 4443 for the ICMPv6 requirement for ID number 67 depicted in Table 2. The SUT meets the previous ICMPv6 RFC 2463. This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they will comply in 1 January 2012 with a software update.

Table 2-3. SUT Interface Status (continued)

NOTES (continued):

- 6 The SUT does not meet the 20 ms failover requirement for ID number 44 depicted in Table 2. The failover time with MPLS enabled was from 27.81 ms to 58.23 ms. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.
- 7 The SUT does not meet the following RFCs for the MPLS requirement for ID number 45 depicted in Table 2: 3479, 4003, 4328, 4872, 4873, 4874, 4974, 5129, and 5331. The SUT partially met the following RFCs for the MPLS requirement for ID number 45 depicted in Table 2: 4447, 3479, and 3036. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.
- 8 The SUT does not support RFC 4382 for the MPLS Layer 3 VPN requirement for ID number 46 depicted in Table 2. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.
- 9 Security testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, Reference (e).

LEGEND:

802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps (125 Mbps)	EIA-232	Standard for defining the mechanical and electrical characteristics for connecting Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) data communications devices
802.3ae	10 Gbps Ethernet		
802.3i	10BaseT Mbps over twisted pair		
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	FRs	Functional Requirements
802.3z	Gigabit Ethernet Standard	Gbps	Gigabits per second
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet	ICMPv6	Internet Control Message Protocol for IPv6
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet	ID	Identification
100BaseFX	100 Mbps Ethernet over fiber	IEEE	Institute of Electrical and Electronics Engineers
1000BaseFX	1000 Mbps Ethernet over fiber	IPv6	Internet Protocol version 6
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	JITC	Joint Interoperability Test Command
10GBaseX	10000 Mbps Ethernet over Category 5 Twisted Pair Copper	Mbps	Megabits per second
A	Access	MPLS	Multiprotocol Label Switching
ASLAN	Assured Services Local Area Network	ms	millisecond
C	Conditional	OS	Operating System
Co	core	POA&M	Plan of Action and Milestones
CRs	Capability Requirements	R	Required
D	distribution	RFC	Request for Comments
DISA	Defense Information Systems Agency	SUT	System Under Test
DoD	Department of Defense	TIA	Telecommunications Industry Association
EIA	Electronic Industries Alliance	UCR	Unified Capabilities Requirements
		UTP	Unshielded Twisted Pair
		VPN	Virtual Private Network

(4) The UCR 2008, Change 1, paragraph 5.3.1.3.2, states that the ASLAN infrastructure components shall provide the following parameters on a per port basis: auto-negotiation, force mode, flow control, filtering, link aggregation, spanning tree protocol, multiple spanning tree, rapid reconfiguration of spanning tree, and port-based access control. The SUT was tested with a series of forced port speeds as well as auto-negotiation. Link failover testing was performed which confirmed spanning tree convergence. All the requirements were met by both testing and vendors LoC with the following minor exceptions:

(a) The UCR 2008, Change 1, paragraph 5.3.1.3.2, states that ASLAN components must meet auto-negotiation in accordance with IEEE 802.3. The SUT does not support auto-negotiation at 10/100 Mbps. However, the SUT does support auto-negotiation with 1 Gbps fiber Small Form Factor Pluggables (SFPs). This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a Plan of Action and Milestones (POA&M) stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.5, which was released in May of 2009.

(b) The UCR 2008, Change 1, paragraph 5.3.1.3.2, states that ASLAN components must meet force mode in accordance with IEEE 802.3. The SUT only supports force mode on 10/100/1000 copper Dense Port Concentrators Ethernet (DPCE). This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they comply with software release Junos 9.4, which was released in February of 2009.

(5) The UCR 2008, Change 1, paragraph 5.3.1.3.3, states that the ASLAN infrastructure components shall support Differentiated Services Code Points (DSCP) in accordance with Request for Comment (RFC) 2474 as stated in the subparagraphs below:

(a) The ASLAN infrastructure components shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and assign that packet to a QoS behavior listed in Section 5.3.1.3.6. The SUT prioritized the following traffic for queuing from lowest to highest with distinct IPv4 DSCP tags using an Ixia IP loader: Data best effort, preferred data, video media and signaling, and voice media and signaling. The IP load included a data best effort load of 100 percent line rate and the other traffic at 55 percent of line rate (25 percent of video signaling, voice signaling, and voice media in the highest priority queue, and 25 percent of video media in the next lower priority queue, and 5 percent of preferred data in the lowest priority queue). The IP loader recorded that the higher prioritized traffic was properly queued by the SUT above lower prioritized best effort traffic. In addition, it was verified that the SUT can assign any DSCP value from 0-63 for each type of traffic, which met this requirement.

(b) The ASLAN infrastructure components shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and reassign that packet to any new DSCP value (0-63). Current DSCP values are provided in Section 5.3.3.3.2. The SUT met this requirement through vendor's LoC.

(c) The ASLAN infrastructure components must be able to support the prioritization of aggregate service classes with queuing according to UCR, Change 1, Section 5.3.1.3.6. The SUT prioritized the following traffic for queuing from lowest to highest with distinct IPv6 service class tags using an IP loader: Data best effort, preferred data, video media and signaling, and voice media and signaling. The IP load

included a data best effort load of 100 percent line rate and the other traffic at 55 percent of line rate (25 percent of video signaling, voice signaling, and voice media in the highest priority queue, and 25 percent of video media in the next lower priority queue, and 5 percent of preferred data in the lowest priority queue). The IP loader recorded that the higher prioritized traffic was properly queued by the SUT above lower prioritized best effort traffic. In addition, the IP loader verified the SUT can assign any IPv6 traffic class value from 0-63 for each type of traffic which met this requirement.

(d) The ASLAN infrastructure components may support the 3-bit user priority field of the IEEE 802.1Q 2-byte Tag Control Information (TCI) field. Default values are provided in UCR, Change 1, Table 5.3.1-4. If provided, the following Class of Service (CoS) requirements apply: The ASLAN infrastructure components shall be capable of accepting any frame tagged with a user priority value (0-7) on an ingress port and assign that frame to a QoS behavior listed in UCR, Change 1, Section 5.3.1.3.6. The ASLAN infrastructure components shall be capable of accepting any frame tagged with a user priority value (0-7) on an ingress port and reassign that frame to any new user priority value (0-7). The SUT met this requirement through testing.

(6) The UCR 2008, Change 1, paragraph 5.3.1.3.4, states that the ASLAN infrastructure components shall be capable of the Virtual LAN (VLAN) capabilities in accordance with IEEE 802.1Q. The SUT was configured with a preset VLAN ID tag using the IP loader. This load was captured at the egress and ingress to ensure that the SUT was properly assigning the VLAN ID in the proper VLAN and not modifying or misplacing the assigned VLAN traffic in any way. In addition, the SUT has the ability to assign any VLAN ID any value from 0 through 4096. The SUT met this requirement with testing.

(7) The UCR 2008, Change 1, paragraph 5.3.1.3.5, states that the ASLAN infrastructure components shall meet the Department of Defense Information Technology Standards Registry (DISR) protocol requirements for IPv4 and IPv6. The SUT prioritized the following traffic for queuing from lowest to highest with distinct IPv4 DSCP tags and IPv6 service class tags using an IP loader: Data best effort, preferred data, video media and signaling, and voice media and signaling. The IP load included a data best effort load of 100 percent line rate and the other traffic at 55 percent of line rate (25 percent of video signaling, voice signaling, and voice media in the highest priority queue, and 25 percent of video media in the next lower priority queue, and 5 percent of preferred data in the lowest priority queue). The IP loader recorded higher prioritized traffic was properly queued by the SUT above lower prioritized best effort traffic. The IP loader verified that the SUT can assign any IPv4 DSCP or IPv6 traffic class value from 0-63 for each type of traffic which met this requirement.

(8) The UCR 2008, Change 1, paragraph 5.3.1.3.6, states that the ASLAN infrastructure components shall be capable of providing the following QoS features:

(a) Provide a minimum of four queues. The SUT has the ability to support up to eight assignable queues; however, only a four-queue model was tested and is covered under this certification.

(b) Assign any tagged session to any of the queues. The SUT met this requirement through testing.

(c) Support Differentiated Services (DiffServ) per hop behaviors (PHBs) in accordance with RFCs 2472, 2474, 2597, 2598, and 3246. The SUT met this requirement through testing.

(d) Support, at a minimum, one of the following: Weighted Fair Queuing (WFQ) in accordance with RFC 3662, Priority Queuing (PQ) in accordance with RFC 1046, or Class-Based WFQ in accordance with RFC 3366. The SUT supports PQ, which was verified through the vendor's LoC. The SUT also supports weighted round robin.

(e) All queues shall be capable of having bandwidth assigned or percentage of traffic. The SUT prioritized the following traffic for queuing from lowest to highest with distinct IPv4 DSCP tags and IPv6 service class tags using an IP loader: Data best effort, preferred data, video media and signaling, and voice media and signaling. The IP load included a data best effort load of 100 percent line rate and the other traffic at 55 percent of line rate (25 percent of video signaling, voice signaling, and voice media in the highest priority queue, and 25 percent of video media in the next lower priority queue, and 5 percent of preferred data in the lowest priority queue). The IP loader recorded that the higher prioritized traffic was properly queued by the SUT above lower prioritized best effort traffic at the assigned bandwidth per queue. Subsequently, the IP loader was reconfigured to increase the video traffic to 35 percent of line rate to ensure the SUT only allowed 25 percent throughput of the video traffic. The captured video throughput measured by the IP loader was 24.999 percent of the line rate, which met this requirement. In addition to testing, this requirement was met by the vendor's LoC.

(9) The UCR 2008, Change 1, paragraph 5.3.1.3.7, states that the ASLAN infrastructure components shall be capable of providing the following Network Monitoring features:

(a) Simple Network Management Protocol (SNMP) in accordance with RFCs 1157, 2206, 3410, 3411, 3412, 3413, and 3414. Testing of this requirement was met using an SNMP management tool, which was used to verify SNMP SETS, GETS, and TRAPS. In addition, the SUT met this requirement through the vendor's LoC.

(b) SNMP Traps in accordance with RFC 1215. The SUT met this requirement through testing and the vendor's LoC.

(c) Remote Monitoring (RMON) in accordance with RFC 2819. The SUT met this requirement through testing and with the vendor's LoC.

(d) Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework in accordance with RFC 3584. The SUT met this requirement with the vendor's LoC.

(e) The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model in accordance with RFC 3826. Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (e).

(10) The UCR 2008, Change 1, paragraph 5.3.1.3.9, states that all switches meet Product Requirements in accordance with UCR 2008, Change 1, Table 5.3.1-5. The SUT met these requirements listed in Table 5.3.1-5 as stipulated throughout this document by testing.

(11) The UCR 2008, Change 1, section 5.3.1.4, states that the ASLAN infrastructure components shall be capable of meeting the End-to-End (E2E) performance requirements for voice, video, and data services. The E2E performance across a LAN is measured from the traffic ingress point to the traffic egress port. The requirements are measured over any five-minute period under congested conditions. Congested condition is defined as 100 percent of link capacities (as defined by baseline traffic engineering (25 percent voice/signaling, 25 percent video, 25 percent preferred data, and 25 percent best effort traffic). The E2E requirements are ASLAN requirements. However, all of the E2E voice, video, and data services performance requirements were met by the SUT when included within an ASLAN. Refer to paragraphs 11.b.(2)(b), 11.b.(2)(c), and 11.b.(2)(d).

(12) The UCR 2008, Change 1, section 5.3.1.6, states that LAN infrastructure components must meet the requirements in the subparagraphs below. Near Real Time (NRT) is defined as within five seconds of detecting the event, excluding transport time.

(a) LANs shall have the ability to perform remote network product configuration/reconfiguration of objects that have existing DoD GIG management capabilities. The Network Management System (NMS) shall report configuration change events in NRT, whether or not the change was authorized. The system shall report the success or failure of authorized configuration change attempts in NRT. The SUT met this requirement by responding in NRT of less than 1 second.

(b) LAN infrastructure components must provide metrics to the NMS to allow them to make decisions on managing the network. The NMS shall have an automated capability to obtain the status of networks and associated assets in NRT 99 percent of the time (with 99.9 percent as an Objective Requirement). Specific metrics are defined in UCR 2008, Change 1, Sections 5.3.2.17 and 5.3.2.18. The SUT met this requirement by responding in NRT of less than 1 second 100 percent of the time.

(c) LAN components shall be capable of providing status changes 99 percent of the time (with 99.9 percent as an Objective Requirement) by means of an automated capability in NRT. An NMS will have an automated capability to obtain the status of networks and associated assets 99 percent of the time (with 99.9 percent as an Objective Requirement) in NRT. The NMS shall collect statistics and monitor bandwidth utilization, delay, jitter, and packet loss. The SUT met this requirement by responding in NRT of less than 1 second 100 percent of the time.

(d) LAN components shall be capable of providing SNMP alarm indications to an NMS. The NMSs will have the capability to perform automated fault management of the network, to include problem detection, fault correction, fault isolation and diagnosis, problem tracking until corrective actions are completed, and historical archiving. Alarms will be correlated to eliminate those that are duplicate or false, initiate test, and perform diagnostics to isolate faults to a replaceable component. Alarms shall be reported as TRAPs via SNMP in NRT. More than 99.95 percent of alarms shall be reported in NRT. The SUT met this requirement by responding in NRT of less than 1 second 100 percent of the time using a Commercial Off the Shelf SNMP tool.

(e) An NMS will have the capability of automatically generating and providing an integrated/ correlated presentation of network and all associated networks. The SUT met this requirement with the vendor's LoC.

(13) The UCR 2008, Change 1, paragraph 5.3.1.8.4, states that if a LAN switch (LS) product offers Multiprotocol Label Switching (MPLS), it must meet the following requirements: LS products are not required to support MPLS. An LS product that implements MPLS must still meet all the ASLAN requirements for jitter, latency, and packet loss. The addition of the MPLS protocol must not add to the overall measured performance characteristics with the following caveats: The MPLS device shall reroute data traffic to a secondary pre-sigaled Label Switched Path (LSP) in less than 20 ms upon indication of the primary LSP failure. The LS products that will be used to provide MPLS services must support the RFCs contained in Table 5.3.1-14. Juniper was the only vendor to be configured for MPLS during the test time frame. Therefore, the SUT is certified for MPLS only with other Juniper switches. The SUT met all of the MPLS requirements with the minor exceptions listed below:

(a) The UCR 2008, Change 1, paragraph 5.3.1.8.4.1, states that the MPLS device shall reroute data traffic to a secondary pre-sigaled LSP in less than 20 ms upon indication of the primary LSP failure. The SUT pre-sigaled failover time exceeds the 20 ms failover requirement with failover times from 27.81 to 54.91 for the BGP protocol and 38.47 to 58.23 for the LDP protocol. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified

within a homogeneous environment and is certified for MPLS with other Juniper switches.

(b) The UCR 2008, Change 1, paragraph 5.3.1.8.4.1, states that the ASLAN Core and Distribution products that will be used to provide MPLS services must support the RFCs contained in Table 5.3.1-14. The SUT does not meet the following RFCs: 3479, 4003, 4328, 4872, 4873, 4874, 4974, 5129, and 5331. The SUT partially meets the following RFCs: 4447, 3479, and 3036. This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.

(c) The UCR 2008, Change 1, paragraph 5.3.1.8.4.2.2, states that the ASLAN products used to support L3VPNs by RFC 4364 shall support the following RFCs: 4382, 4577, 4659, and 4684. The SUT does not support RFC 4382 (MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base). This was adjudicated by DISA on 2 July 2010 as having minor operation impact for the following reasons. This is a new requirement and the vendor has 18 months to develop this. The vendor will provide a POA&M for resolving any noted discrepancies. This was tested and certified within a homogeneous environment and is certified for MPLS with other Juniper switches.

(14) The UCR 2008, Change 1, paragraph 5.3.5.4, states the IPv6 product requirements. These requirements were met by both testing and vendor LoC. The SUT met the minimum critical IPv6 product requirements as a LAN switch with the following minor exception, RFC 4443. The SUT meets the previous ICMPv6 RFC 2463. This was adjudicated by DISA on 7 May 2010 as having a minor operational impact with the stipulation that the vendor provide a POA&M stating when they plan to implement these requirements. The vendor POA&M states they will comply in 1 January 2012 with a software update.

(15) The UCR 2008, Change 1, paragraphs 5.3.1.3.8, 5.3.1.5, 5.3.1.6, state that ASLAN components must meet security requirements. Security is tested by DISA-led Information Assurance test teams and published in a separate report, Reference (e).

c. System Interoperability Results. The SUT MX480 and MX960 are certified for joint use within the DSN as a core, distribution, and access switch. The SUT MX240 is certified for joint use within the DSN as a distribution distribution switch. The SUT is also certified with any digital switching systems listed on the UC APL which are certified for use with an ASLAN or non-ASLAN. The SUT is certified to support DSN Assured Services over IP as an ASLAN in accordance with the requirements set forth in the UCR. If a system meets the minimum requirements for an ASLAN, it also meets the lesser requirements for a non-ASLAN. Non-ASLANs are “commercial grade” and provide support to C2R or non-C2 voice subscribers. The SUT is certified for joint use as a non-ASLAN for C2R and non-C2 traffic. Non-ASLANs may provide MLPP to users

authorized to originate only ROUTINE precedence calls but terminate all precedence levels. Non-ASLANs do not need to meet the availability or redundancy requirements of the Special C2 users or the C2 users capable of originating precedence calls above ROUTINE. Since non-ASLANs are not required to support the reliability requirements detailed in the UCR for ASLANs, C2 users and Special C2 users are not authorized to be served by a non-ASLAN.

12. TEST AND ANALYSIS REPORT. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: ucco@disa.mil.